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Geology and Oil Resources of the West Border of the San Joaquin Valley North of Coalinga, California. By ROBERT ANDERSON and ROBERT W. PACK. U.S. Geol. Surv., Bull. No. 603, 1915. Pp. 220, pls. 14, figs. 5.

The region described in this bulletin is a strip 8 to 20 miles wide and 130 miles long lying along the east flank of the Diablo Range and the adjacent western edge of the San Joaquin plain. This foothill belt was studied with a view to determining whether or not oil fields exist, as in the Coalinga and other districts farther south. In so far as finding new oil fields is concerned, the examination proved disappointing. Organic shales were found in great quantity, but there are few spur folds running out toward the valley. The presence of oil pools to the south is determined by such folds.

The oldest rocks in the Diablo Range belong to the Franciscan formation, of supposed Jurassic age, which is separated from the oldest Cretaceous rocks by a great unconformity. The Knoxville group (Comanche) is believed to be absent. The Chico (Cretaceous) is represented by the Panoche and Moreno formations, marine shales and sandstones that reach the enormous thickness of 24,000 feet. The Moreno, composed largely of organic remains such as diatoms and foraminifers, has been referred by some authors to the Tertiary, but it is now found to contain Cretaceous fossils. Hitherto strata of this type have been known in California only in the Tertiary.

The Martinez (lower Eocene) is present only in the southern part of the area, where it is represented by 5,000 feet of marine beds. The Tejon (upper Eocene) is present throughout the region, varying in thickness from 50 to 2,200 feet. The Oligocene is represented by the Kreyenhagen diatomaceous shale, with unconformities above and below. In the southern part of this belt the Miocene is represented, as in the Coalinga district, by the Vaqueros, Santa Margarita, and Etchegoin-Jacolitos formations, with a maximum thickness of 5,000 feet, each separated from the next adjoining by an unconformity. The Big Blue serpentine, formerly considered to represent the lower part of the Santa Margarita, contains typical Vaqueros fossils. Farther north the lower and middle Miocene were not differentiated. The San Pablo is equivalent in part at least to the Etchegoin-Jacolitos. Post-Miocene beds up to 2,200 feet thick are tentatively correlated with the Tulare formation.

The local factors influencing the accumulation of oil, evidences of oil in the region, and the future possibilities of development are dis-

cussed in detail. The oil is believed to have been derived from the two organic shales, and apparently each gave rise to a different type of oil—the Moreno to a light paraffin oil and the Kreyenhagen to a heavy asphalt oil. The diatoms are believed to have been the greatest contributors in the formation of the oil.

H. R. B.

Mineral Resources of Alaska for 1914. By ALFRED H. BROOKS and Others. U.S. Geol. Surv., Bull. No. 622, 1915. Pp. 380, pls. 11, figs. 8.

This volume is the eleventh of a series of annual bulletins summarizing the results of the investigations of Alaskan mineral resources and the status of the industry in the territory. Fourteen papers deal with the mineral resources of certain districts.

The gold and copper deposits of the Port Valdez district are described by B. L. Johnson. The country rock includes basic lavas, slates, gray-wackes, and other sediments of Mesozoic age. Gold occurs in quartz-filled fissure veins formed at moderate depths; the copper chiefly as sulphide impregnations and replacements of sheared zones along the fractures. The mineral association in both gold and silver ores is practically the same, varying only in relative proportions. The sulphide minerals are pyrite, chalcopyrite, galena, sphalerite, and some pyrrhotite and arsenopyrite. There was but one period of mineralization. As in the Ellamar district, both types had a common origin in solutions that circulated subsequent to late Mesozoic intrusions, with which they were probably genetically related.

P. S. Smith and A. G. Maddren describe the quicksilver prospects of the Kuskokwin region. The ore occurs in brecciated zones in Cretaceous sandstones and shales at the contacts of granitic and andesite dikes. Cinnabar, generally with stibnite, occurs in quartz veinlets and stringers. In places calcite and siderite are present. Some cinnabar has also been obtained from placer gravels, and detritus in a stream near one of the deposits contains native mercury.

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